Accordingly, applicants' have amended Claim 1 to further emphasize that the product stream which is obtained in stage (B) does not contain any significant amounts of acetylenically unsaturated hydrocarbons or allenes, and that the said product stream is employed in stage (C) without a prior partial hydrogenation.[2] Additionally, applicants have made some editorial changes in the wording of Claim 7 and have corrected a typographical error in Claim 8. No new matter has been added.

The Examiner objected to the specification pointing to MPEP §608.01(b) and stating that the abstract should be limited to 50 to 150 words in a single paragraph. It is respectfully noted that the requirements pertaining to form and content of the application are governed by the provisions of the PCT and its Regulations.[3] Under those provisions, the abstract is not required to be in a single paragraph. Additionally, applicants respectfully urge that the abstract does not exceed 150 words and therefore fully complies with the requirements of PCT Rule 8.1. It is accordingly solicited that the Examiner withdraw the objection.

Further, the Examiner objected to Claims 8 and 9 in light of a typographical error in Claim 8. Applicants' amendment corrects the error and withdrawal of the respective objection is therefore respectfully solicited.

The Examiner rejected Claims 7 to 9 under 35 U.S.C. §112, ¶2, as being indefinite, and suggested that Claim 7 should be recited as a further step from claim 1 rather than a different process. Applicants wish to thank the Examiner for the helpful suggestion which was, at least in part, adopted in the revision of Claim 7. It is however noted that the further step which is conducted in accordance with the provisions of Claim 7 is a step succeeding the stages defined in Claim 1 so that the product which is obtained in accordance with Claim 1 is further altered in the additional step which is required according to Claim 7. Applicants have therefore refrained from changing the products referenced at the outset of Claim 7. Withdrawal of the rejection is respectfully solicited.

Additionally, the Examiner rejected Claims 1 to 7 under 35 U.S.C. §103(a) as being unpatentable in light of the teaching of ***Dutcher*** (US 2,438,041) when taken in view of the disclosure of ***Adams et al.*** (US

2) Cf., e.g., page 3, indicated lines 16 to 18, of the application.

3) Cf. PCT Article 27(1).

3,161,670). The Examiner pointed out in this context that ***Dutcher*** teaches a process in which butadiene was dimerized to form 4-vinylcyclohexene, and that ***Adams et al.*** discloses a butadiene which is produced via similar steps as required in accordance with applicants' process, and argued that a person of ordinary skill in the art would have been motivated to employ the product of ***Adams et al.*** as a butadiene source in the process of ***Dutcher*** *"since it is expected that using any butadiene feed would yield similar results."*[4]

Applicants respectfully disagree with the Examiner's conclusion. As outlined in the application,[5] butadiene is prepared mainly by thermal cracking of saturated hydrocarbons, usually using naphtha as raw material, The cracking of naphtha results in a hydrocarbon mixture which comprises methane, ethane, ethane, acetylene, propane, propene, propyne, allene, butanes, butadiene, butynes, methylallme, C_5-hydrocarbons and higher hydrocarbons.

However, acetylenically unsaturated hydrocarbons such as acetylene, propyne, 1-butyne, 2-butyne, butenyne and diacetylene interfere in the butadiene dimerization. Even traces of these compounds can poison the copper-containing dimerization catalyst. Butynes and allenes likewise react with butadiene in a Diels-Alder reaction and lead to by-product formation. In particular, butynes are very difficult to separate from butadiene by distillation or extraction. Therefore, when using butadiene from crackers, it is necessary to precede the butadiene dimerization by a hydrogenation step in which the acetylenically unsaturated hydrocarbons and allenes are partially hydrogenated.

The need to observe certain purity requirements regarding the butadiene which is employed in the preparation of 4-vinylcyclohexene, ethylbenzene and styrene is *inter alia* acknowledged in the background art. ***Rieve et al.***, for example, state that *"the purity of the product [butadiene] and its suitability as feed for a styrene production plant is among the desiderata,"*[6] and ***Voorhees*** points out that it is an object of his invention *"to prepare styrene in a high state of purity by synthesis from hydrocarbons which are readily available in a high state of purity at moderate cost."*[7] Correspondingly, the

4) Cf. page 4, lines 6 and 7, of the application.

5) Cf. page 1, indicated line 22, to page 2, indicated line 12, of the application.

6) Cf. col. 1, indicated lines 29 to 35, of ***US 4,029,715***; of record.

7) Cf. col. 1, indicated lines 8 to 11, of ***US 2,376,985***; of record.

teaching of ***Dutcher*** relates to a process in which butadiene is employed rather than a product stream which contains butadiene as one of the constituents.[8] In light of this technical background knowledge it is immediately apparent that a person of ordinary skill in the pertinent art cannot reasonably consider all butadiene streams to be equally suited to serve as butadiene starting material in the process of ***Dutcher***. Accordingly, the rationale used by the Examiner to explain why a person of ordinary skill in the art would have been motivated to combine the process of ***Adams et al.*** and the process of ***Dutcher*** is not applicable here. Moreover, the disclosure of ***Adams et al.*** contains nothing which could be taken to suggest or imply that the butadiene product which is obtained in the process meets the purity requirements which are imposed where the production of 4-vinylcyclohexene, ethylbenzene and styrene is concerned. In consideration of the foregoing, neither ***Dutcher***'s teaching nor the disclosure of ***Adams et al.*** can be taken to motivate a person of ordinary skill in the art to make the combination upon which the Examiner relies.

To establish a prima facie case of obviousness, three basic criteria must be met and one of those basic criteria is that there be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. It is error if the motivation is based on the applicant's disclosure.[9] Here, there is clearly no motivating suggestion in either one of the references or in the knowledge generally available to one of ordinary skill in the art, which means that the references are insufficient to establish that applicants' invention was prima facie obvious at the time it was made.

Another one of the basic criteria which has to be met in order to establish a prima facie case of obviousness is that there must be a reasonable expectation of success, and -like the motivation- the reasonable expectation of success must be found in the prior art and cannot be based on the applicant's disclosure.[10] As explained in the application and corroborated by the background art, the composition of the butadiene stream which is employed in the synthesis of 4-vinylcyclohexene, ethylbenzene and styrene is crucial with regard to

8) Cf. in particular the illustrative example, col. 4, indicated line 45, to col. 5, indicated line 3, of ***US 2,438,041***.

9) *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

10) *In re Vaeck*, ibid.

the success of the process. Also nothing in the disclosure of ***Adams et al.*** suggests or implies that the butadiene-containing product stream which is obtained in the catalytic dehydrogenation of butanes to butylenes and subsequent direct catalytic oxidative dehydrogenation of the butylenes meets the requirements which render the stream suitable as a starting material for the manufacture of 4-vinylcyclohexene, ethylbenzene and styrene. Based on the referenced art and the technical background knowledge in the pertinent technology, a person of ordinary skill could, therefore, not reasonably expect to be successful when combining the teaching of ***Dutcher*** and the disclosure of ***Adams et al.*** in the manner done by the Examiner. This further corroborates that the references upon which the Examiner relied in rejecting applicants' claims are insufficient to establish a prima facie case of obviousness.

When viewed with due consideration of the intricacies of the pertinent technology, the teaching of ***Dutcher*** taken in view of the disclosure of ***Adams et al.*** cannot be considered to render applicants' invention unpatentable under Section 103(a). It is therefore respectfully requested that the respective rejection be withdrawn. Favorable action is solicited.

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Respectfully submitted,
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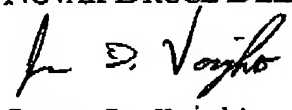

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Encl.: CLAIM AMENDMENTS (Appendix I)

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